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Suicide attempts before joining the military increase risk for suicide attempts and severity of suicidal ideation among military personnel and veterans

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Abstract

Objective: Past self-injurious thoughts and behaviors (SITB) are robust predictors of future suicide risk, but no studies have explored the prevalence of SITB occurring prior to military service among military personnel and veterans, or the association of premilitary SITB with suicidal ideation and suicide attempts during or after military service. The current study explores these issues in two separate samples.
Method: Self-report data were collected from 374 college student veterans via anonymous only survey (Study 1) and from 151 military personnel receiving outpatient mental health treatment (Study 2).
Results: Across both studies, premilitary suicide attempts were among the most prominent predictor of subsequent suicide attempts that occurred after joining the military, even when controlling for demographics and more recent emotional distress. Among military personnel who made a suicide attempt during or after military service, approximately 50% across both samples experienced suicidal ideation and up to 25% made a suicide attempt prior to joining the military. Military personnel and veterans who made suicide attempts prior to joining the military were over six times more likely to make a later suicide attempt after joining the military. In Study 2, significantly more severe current suicidal ideation was reported by participants with histories of premilitary suicide risk, even when controlling for SITB occurring while in the military.
Conclusions: Military personnel and veterans who experienced SITB, especially suicide attempts, prior to joining the military are more likely to attempt suicide while in the military and/or as a veteran, and experience more severe suicidal crises.
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1. Introduction

Suicides in the United States Armed Forces continue to rise across all Branches of service. Suicide is the second-leading cause of death among military personnel [1], and in the first six months of 2012, more military personnel died by suicide than by combat-related injuries or causes [2]. A number of relatively dynamic psychological risk factors for self-injurious thoughts and behaviors (SITB) such as suicidal ideation, suicide planning, and suicide attempts have recently been confirmed in military populations, including depression [3,4], insomnia [5], hopelessness [6], and perceived burdensomeness [7,8]. Dispositional risk factors have likewise been identified (e.g., male gender, younger age, history of psychiatric diagnosis; [1]) but have received much less attention relative to situational stressors such as interpersonal conflict, deployment, and combat exposure, although considerable evidence suggests that dispositional and historical variables show much stronger relationships with SITB among military personnel [9,10].

Although a number of predisposing baseline risk factors for suicide have been identified, the role of previous SITB is especially well-established [11–13]. Specifically, individuals

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who have been suicidal in the past, especially those who have made suicide attempts, report significantly higher levels of psychopathology that tend to endure for longer periods of time [14–17]. Military data indicate that past self-injurious behavior is known in approximately 13% of suicide deaths and over 25% of suicide attempts among service members [1]. Furthermore, previous suicide attempts are associated with more intense current suicidal ideation among active duty service members even when controlling for a large number of suicide risk factors including depression, hopelessness, gender, and personality traits [13].

One model of suicide risk that explains how past SITB contributes to future SITB is the *fluid vulnerability theory* [18], which posits that suicide risk is best understood as an interaction between dispositional risk factors (referred to as *baseline* risk) and situational risk factors and stressors (referred to as *acute* risk). Baseline risk includes relatively stable vulnerabilities to suicide that persist over time and serve as an individual's "set point" for experiencing suicidal crises, whereas acute risk includes relatively transient life events and emotional distress that can fluctuate in intensity over time. From the perspective of fluid vulnerability theory, military suicide is more accurately understood as the combination of situational stressors and acute distress *within the context of* predisposing baseline vulnerabilities. To this end, fluid vulnerability theory hypothesizes the following about how preexisting vulnerabilities contribute to the process of suicide risk over time [18]:

1. Baseline risk varies from individual to individual, and is established by dispositional factors and variables that influence the person's threshold level for activation. For those with elevated baseline risk, the threshold activation level is reduced, such that suicidal episodes occur even during times of relatively low stress.
2. After resolution of an acute suicidal episode, individuals return to their baseline risk level, which means that individuals with elevated baseline risk remain at increased risk for SITB even when they are not in acute distress or have not experienced a recent crisis.
3. Because past suicidal episodes result in easier activation of future suicidal episodes, repeated SITB, especially multiple suicide attempts, indicate elevated baseline risk.
4. The severity of the suicidal episode depends on both the individual's baseline risk and the severity of aggravating risk factors (e.g., situational stressors, emotional distress).

As applied to military and veteran suicide risk, the fluid vulnerability theory posits that SITB occurring *prior* to military service elevates a service member or veteran's baseline risk for suicide, thereby making it "easier" for a service member or veteran to be suicidal again in the future. From the perspective of the fluid vulnerability theory, military personnel and veterans who have experienced SITB before they joined the military, especially those who have made suicide attempts, are (a) more likely to make suicide attempts while in the military and (b) will experience more intense suicidal episodes.

Unfortunately, to date there are no known studies that explore *when* service members and veterans first experience SITB relative to their military service. More specifically, there are no studies that report how many military personnel and veterans first experience SITB *before* joining the military as compared to *after* joining the military, and how they are related to each other. Perhaps because of this general absence of data, public and professional discourse about military and veteran suicide has largely omitted the potential role of preexisting vulnerabilities that serve to elevate risk for SITB during or following military service, despite the fact that these vulnerabilities may have a relatively stronger relationship with military and veteran suicide than other commonly-investigated risk factors such as psychiatric symptoms and life stressors. Such data could yield important contextual information about how (and when) suicide risk first emerges in military personnel and which military personnel are most vulnerable to experiencing suicidal behavior after joining the military, which could inform screening and treatment procedures with these populations.

The primary aims of the current study were (1) to provide preliminary data regarding the prevalence of premilitary SITB among military personnel and veterans, and (2) to determine the relationship of premilitary SITB with SITB that occurred during or after military service. We additionally hypothesized that military personnel and veterans who made suicide attempts prior to military service would be significantly more likely to make a suicide attempt during or after military service, and would experience more severe suicidal episodes during or after military service. Two separate samples were used to explore these questions: a nonclinical sample of military personnel and veterans enrolled in college classes (i.e., "student veterans") and a clinical sample of military personnel receiving outpatient mental health treatment.

2. Study 1: student veterans

2.1. Method

2.1.1. Participants

Participants included 374 military personnel (34.0%) and veterans (66.0%) ranging in age from 19 to 78 years (M = 36.76, SD = 10.40) who were enrolled in college classes. Gender distribution was 71.7% male and 28.3% female. Racial distribution was 82.1% Caucasian, 5.3% African American, 3.2% Native American, 3.4% African–American, 2.4% Asian, and 1.1% Pacific Islander. Latino/Hispanic ethnicity was additionally endorsed by 11.0% of participants. Branch of service included 32.6% Air Force, 35.8%

Army, 7.5% Marine Corps, 20.3% Navy, and 1.3% Coast Guard.

2.1.2. Procedures

Participants were recruited through partnering universities and colleges, who forwarded a weblink to the online survey via email to known student veterans. Participants read an informed consent statement on the first page of the survey and then chose whether or not to complete the survey. Upon completion, participants were encouraged to forward the weblink to friends, classmates, and colleagues. The survey was completely anonymously, and was comprised of several self-report surveys that took an average of 12–15 min to complete. A total of 508 participants accessed the survey, of which 374 (73.6%) provided complete data and were military personnel and veterans. The current study was reviewed and approved by the University of Utah Institutional Review Board.

2.1.3. Instruments

2.1.3.1. Self-Injurious Thoughts and Behaviors (SITB). A self-report version of the Self-Injurious Thoughts and Behaviors Interview (SITBI; [19]) was used to assess the presence, frequency, timing, and characteristics of suicidal ideation ("have you ever had thoughts of killing yourself?"), suicide plans ("have you ever actually made a plan to kill yourself?"), nonsuicidal self-injury (NSSI; "have you ever actually engaged in nonsuicidal self-injury, that is, purposely hurting yourself without wanting to die, for example by cutting or burning?"), and suicide attempts ("have you ever made an actual attempt to kill yourself in which you had at least some intent to die?") during the individual's lifespan. For those who positively endorsed each item, respondents were then asked to report their age when they first and last experienced each thought or behavior. The scale has good interrater reliability (κ = .99), test–retest reliability over six months (κ = .70), and demonstrates strong convergent validity with other measures of SITB [19].

2.1.3.2. Depression. The Patient Health Questionnaire-9 (PHQ-9; [20]) was used to assess the severity of depression symptoms. The PHQ-9 asks respondents to indicate the frequency with which they have experienced each of the nine *DSM-IV-TR*-defined diagnostic criteria for major depressive disorder during the preview two weeks. Item responses range from 0 ("not at all") to 3 ("nearly every day") and are summed together, with higher total scores indicating more severe depression symptoms. The scale is widely-used as a reliable and valid indicator of depression. Internal consistency for the PHQ-9 in the current sample was .91.

2.1.3.3. Posttraumatic stress. Posttraumatic stress symptoms were assessed with the PTSD Checklist Short Form (PCL-SF; [21]), which is an abbreviated 6-item version of the full 17-item PTSD Checklist (PCL; [22]). The PCL-SF's six items were chosen by selecting the two items from each PTSD symptom cluster that correlated highest with the full scale score and with its respective symptom cluster total score: intrusive memories and images of the trauma, emotional distress when reminded of the trauma (cluster B); avoidance of activities and situations that remind of the trauma, feeling distant or cutoff from others (cluster C); feeling irritable or angry, feeling super alert (cluster D). The PCL-SF correlates very high with the full PCL (r = .97), and is comparable to the PCL in terms of sensitivity and specificity for a diagnosis of PTSD. Internal consistency for the current sample was .93.

2.2. Results

2.2.1. What proportion of student veterans experienced SITB prior to joining the military?

Of the 374 student veterans with complete survey date, 136 (36.4%) reported a lifetime history of suicidal ideation, 57 (15.2%) reported making a suicide plan, 52 (13.9%) reported nonsuicidal self-injury, and 29 (7.8%) reported making a suicide attempt. To determine if participants experienced any SITB before joining the military, we compared the reported age of first onset for suicidal ideation, suicide plans, nonsuicidal self-injury, and suicide attempts to each participant's reported age when he or she joined the military. Prior to joining the military, 82 (21.9%) participants reported suicidal ideation, 22 (5.9%) reported making a suicide plan, 33 (8.8%) reported engaging in NSSI, and 12 (3.2%) reported making a suicide attempt (see Table 1). There were no significant differences in rates of SITB according to military status (i.e., veteran versus active military).

2.2.2. Of those student veterans who made a suicide attempt after joining the military, what proportion experienced SITB prior to joining the military?

Eighteen (4.8%) student veterans made a suicide attempt after joining the military (i.e., while in the military or while a veteran). Nine of these 18 (50.0%) participants reported suicidal ideation, 2 (11.1%) had made a suicide plan, 4 (22.2%) engaged in NSSI, and 3 (16.7%) had made a suicide

Table 1
Proportions of military personnel and veterans who experienced suicidal ideation, suicide plan, nonsuicidal self-injury, and suicide attempt prior to military service.

	n (%)
Study 1: College student veterans	
Premilitary suicidal ideation	82 (21.9%)
Premilitary suicide plan	22 (5.9%)
Premilitary nonsuicidal self-injury	33 (8.8%)
Premilitary suicide attempt	12 (3.2%)
Study 2: Air Force mental health clinic	
Premilitary suicidal ideation	25 (16.6%)
Premilitary suicide plan	9 (6.0%)
Premilitary nonsuicidal self-injury	9 (6.0%)
Premilitary suicide attempt	5 (3.3%)

Table 2
Proportions of military personnel and veterans who made a suicide attempt during or after military service with a history of premilitary suicide ideation, suicide plan, nonsuicidal self-injury, and suicide attempt.

Study 1: College student veterans (n = 18)	
Premilitary suicidal ideation	9 (50.0%)
Premilitary suicide plan	2 (11.1%)
Premilitary nonsuicidal self-injury	4 (22.2%)
Premilitary suicide attempt	3 (16.7%)
Study 2: Outpatient clinical setting (n = 8)	
Premilitary suicidal ideation	4 (50.0%)
Premilitary suicide plan	3 (37.5%)
Premilitary nonsuicidal self-injury	1 (12.5%)
Premilitary suicide attempt	2 (25.0%)

attempt before joining the military (see Table 2).

2.2.3. Does premilitary SITB increase risk for suicide attempts after joining the military?

We next used binary logistic regression to test the associations among premilitary SITB and suicide attempts that occurred after joining the military. Results are summarized in Table 3, and indicated that participants who made a suicide attempt after joining the military were more likely to have experienced suicidal ideation (11.0% vs. 3.1%; OR = 3.70 [1.41–9.67], p = .008), NSSI (12.1% vs. 4.1%; OR = 3.28 [1.01–10.67], p = .049), and suicide attempts (25.0% vs. 4.1%; OR = 9.06 [2.13–38.55], p = .003) prior to military service, but were not more likely to have made a suicide plan prior to military service (9.1% vs. 4.5%; OR = 2.13 [.45–9.96], p = .336). When adjusting for gender, age, depression symptoms, and posttraumatic stress symptoms, premilitary suicidal ideation (AOR = 2.69 [.95–7.61], p = .059) and premilitary suicide attempts continued to be associated with increased risk for later suicide attempts after joining the military (AOR = 5.60 [1.25–25.39], p = .025).

All four types of premilitary SITB were next entered into the regression model simultaneously to evaluate the relative strength of each variable while controlling for each other and covariates. Results of this final model are displayed in Table 4, and indicated that the likelihood of suicide attempts after joining the military was significantly more likely among participants who had made a suicide attempt prior to joining the military (AOR = 7.58 [1.13–50.73]). No other forms of premilitary SITB were significantly associated with suicide attempts after joining the military.

Table 4
Logistic regression coefficients predicting suicide attempts during or after military service among college student veterans.

	B	SE	AOR	(95% C.I.)	p
Premilitary suicidal ideation	.879	.629	2.41	(.70–8.27)	.163
Premilitary suicide plan	−1.505	.906	.22	(.04–1.31)	.097
Premilitary NSSI	.292	.733	1.34	(.32–5.63)	.690
Premilitary suicide attempt	2.025	.970	7.58	(1.13–50.73)	.037
Gender	−.235	.570	.79	(.26–2.41)	.679
Age	.050	.022	1.05	(1.01–1.10)	.021
Posttraumatic stress	.062	.054	1.06	(.96–1.18)	.248
Depression	.121	.048	1.13	(1.03–1.24)	.012

2.3. Discussion

Results of the current study indicate that 22% of military personnel and veterans enrolled in college classes experienced suicidal ideation, 6% made a suicide plan, 9% engaged in nonsuicidal self-injury, and 3% made a suicide attempt before they joined the military. Of those who made a suicide attempt after joining the military, half had experienced suicidal ideation and 17% had made a suicide attempt prior to joining the military. Results of the current study suggest that military personnel and veterans who experience SITB before they join the military are at significantly increased risk for making suicide attempts as a service member or veteran. This relationship is especially robust for suicide attempts. In the current study, 25% of participants who had made a suicide attempt prior to military service subsequently made a suicide attempt after joining the military, as compared to only 4% of those who had not made a suicide attempt prior to military service. Premilitary suicide attempts remained a significant a predictor of later suicide attempts even when controlling for the effects of premilitary suicidal ideation,

Table 3
Relationship of premilitary suicide risk with suicide attempts during or after military service.

	OR	(95% C.I.)	p	AOR[a]	(95% C.I.)	p
Study 1: College student veterans						
Premilitary suicidal ideation	3.70	(1.41–9.67)	.008	2.69	(.95–7.61)	.059
Premilitary suicide plan	2.13	(.45–9.96)	.339	1.27	(.22–7.31)	.788
Premilitary nonsuicidal self-injury	3.28	(1.01–10.67)	.049	1.81	(.47–6.93)	.389
Premilitary suicide attempt	9.06	(2.13–38.55)	.003	5.60	(1.24–25.39)	.025
Study 2: Outpatient clinical setting						
Premilitary suicidal ideation	5.81	(1.35–25.05)	.018	2.89	(.50–16.50)	.237
Premilitary suicide plan	13.70	(2.64–71.22)	.002	5.17	(.77–34.86)	.092
Premilitary nonsuicidal self-injury	2.41	(.26–22.05)	.436	1.30	(.22–7.53)	.774
Premilitary suicide attempt	15.56	(2.18–111.20)	.006	9.06	(.93–88.56)	.058

[a] Adjusting for gender, age, depression, and posttraumatic stress symptoms; AOR = adjusted odds ratio.

suicide plans, NSSI, current psychological distress, and demographic covariates. These findings suggest that at least half of military personnel and veterans who engage in suicidal behaviors have a history of SITB that predates their military service, and that individuals who attempt suicide before joining the military may possess a vulnerability to later suicidal behavior that may be relatively stronger than more recent risk factors such as emotional distress and demographic variables.

The current study is limited by self-report methodology, which can be vulnerable to recall bias, especially for historical events such as past SITB. Conclusions are also limited by the our use of military personnel and veterans who were enrolled in college classes which may not reflect the larger military and veteran populations, as student veterans could be a unique subgroup that differs from other military personnel and veterans. For example, results may not generalize to other subgroups such as those seeking out mental health treatment or to those who are not pursuing higher education degrees. Additional studies with other subgroups of military personnel and veterans are therefore needed to replicate these initial findings.

3. Study 2: military clinical sample

3.1. Method

3.1.1. Participants

Participants included 151 active duty military personnel (64.4% male, 35.6% female) who were currently in outpatient mental health treatment at two Air Force mental health clinics in the southern and intermountain U.S. Participants were predominantly (96.7%) Air Force personnel, with a much smaller number of Army personnel (3.3%). Age ranged from 20 to 55 years (M = 34.98, SD = 8.36), with the following rank distribution: 22.0% junior enlisted (E1–E4), 40.6% noncommissioned officer (E5–E6), 16.0% senior noncommissioned officer (E7–E9), 1.4% warrant officer, and 20.0% officer. Self-reported racial identity was 66.9% Caucasian, 20.5% African–American, 1.3% Asian, 1.3% Pacific Islander, 2.0% American Indian, and 5.3% "other." Hispanic/Latino ethnicity was additionally endorsed by 8.8% of patients. Participants had deployed a mean of 1.15 times (SD = 1.35, range: 0–6 deployments).

3.1.2. Procedures

Participants were recruited from two outpatient military mental health clinics, one located in the South U.S. and the second located in the West U.S. All current patients and new patients were invited to participate by clinic staff following their regularly-scheduled mental health appointments or intake appointments, without exclusion. The only inclusion criterion was to be currently accessing outpatient mental health treatment; there were no exclusion criteria. Patients voluntarily provided informed consent for the study and then completed an anonymous survey packet in the waiting room immediately following invitation and agreement to participate. Completed packets were returned to collection boxes located at the check-in desks of each clinic. 172 patients were invited to participate, of which 151 (87.8%) agreed to participate. The current study was reviewed and approved as exempt research by the Wright-Patterson Air Force Base Institutional Review Board, and conducted in accordance with the Helsinki Declaration.

3.1.3. Instruments

3.1.3.1. Self-Injurious Thoughts and Behaviors (SITB). The SITBI, described above in Study 1, was used to assess the presence, frequency, timing, and characteristics of SITB.

3.1.3.2. Depression. The PHQ-9, described above in Study 1, was used to assess depression symptom severity. Internal consistency for the PHQ-9 in the current sample was .91.

3.1.3.3. Posttraumatic stress. The PTSD Checklist, Military Version (PCL-M; [23]) was used to assess the severity of PTSD symptoms. The PCL-M is comprised of 17 items that assess each of the *DSM-IV-TR*-defined symptom criteria for PTSD, and directs respondents to indicate the severity with which each symptom of PTSD has been experienced within the past 30 days on a scale ranging from 1 ("not at all") to 5 ("extremely"). The scale has demonstrated excellent reliability and diagnostic utility for PTSD. Internal consistency for the PCL-M in the current sample was .97.

3.1.3.4. Current suicidal ideation. The Beck Scale for Suicide Ideation (BSSI; [24]) was used to measure the severity of current (i.e., within the past week) suicidal ideation such as frequency and duration of ideation, specificity of planning, and preparations for death. The BSSI has very good internal consistency and convergent validity, and has been found to predict future suicide attempts and death by suicide [24]. Internal consistency for the BSSI in the current sample was .87.

3.2. Results

3.2.1. What proportion of military personnel experienced SITB prior to joining the military?

Of the 151 military personnel receiving outpatient mental health treatment, 43 (28.5%) reported a lifetime history of suicidal ideation, 19 (12.6%) reported making a suicide plan, 14 (9.3%) reported nonsuicidal self-injury, and 11 (7.3%) reported making a suicide attempt. To determine if participants experienced any SITB before joining the military, we compared the reported age of first onset for suicidal ideation, suicide plans, nonsuicidal self-injury, and suicide attempts to participants' reported age when they joined the military. Prior to joining the military, 25 (16.6%) participants reported suicidal ideation, 9 (6.0%) reported making a suicide plan, 9 (6.0%) reported engaging in

nonsuicidal self-injury, and 5 (3.3%) reported making a suicide.

3.2.2. Of those military personnel who made a suicide attempt after joining the military, what proportion experienced SITB prior to joining the military?

Eight (5.3%) participants made a suicide attempt after joining the military. Four of these 8 (50.0%) reported suicidal ideation, 3 (37.5%) had made a suicide plan, 1 (12.5%) engaged in nonsuicidal self-injury, and 2 (25.0%) had made a suicide attempt prior to joining the military (see Table 2).

3.2.3. Does premilitary SITB increase risk for suicide attempts while in the military?

We next used binary logistic regression to test the associations among premilitary SITB with suicide attempts that occurred while in the military. Results are displayed in Table 3 and indicated that participants who made a suicide attempt while in the military were more likely to have experienced suicidal ideation (50.0% vs. 14.7%; OR = 5.81 [1.35–25.05], p = .018), suicide plans (37.5% vs. 4.2%; OR = 13.70 [2.64–71.22], p = .002), and suicide attempts (25.0% vs. 2.1%; OR = 15.56 [2.18–111.20], p = .006) prior to military service, but not more likely to have engaged in nonsuicidal self-injury prior to military service (12.5% vs. 5.6%; OR = 2.41 [.26–22.05], p = .436). When adjusting for gender, age, depression symptoms, and posttraumatic stress symptoms, premilitary suicide attempts (AOR = 9.06 [.93–88.56], p = .058) continued to be associated with suicide attempts during military service, although this fell just shy of the a priori level of statistical significance. We were unable to consider the simultaneous effects of all four types of premilitary SITB, however, due to model specification errors resulting from insufficient statistical power.

3.2.4. Are premilitary SITB associated with more severe suicidal episodes while in the military?

To determine if premilitary SITB are associated with greater severity current suicidal ideation, we used generalized regression modeling with robust estimation. Premilitary suicidal ideation, suicide plans, nonsuicidal self-injury, and suicide attempts were entered into the regression model simultaneously, the BSSI total score was used as the outcome variable (i.e., severity of recent suicidal ideation), and covariates included gender, age, depression symptoms, and posttraumatic stress symptoms. Results of analysis are displayed in Table 5 (Model A) and indicated that participants who had engaged in nonsuicidal self-injury (B = 4.547, SE = 1.661, p = .006) and made a suicide attempt (B = 8.743, SE = 3.157, p = .006) prior to joining the military reported significantly more severe suicidal ideation during the past week. Neither premilitary suicidal ideation (B = 1.103, SE = .921, p = .231) nor suicide plans (B = .106, SE = 2.227, p = .962) were associated with more severe recent suicidal ideation, however. Premilitary nonsuicidal self-injury (B = 3.085, SE = 1.434, p = .031) and suicide attempts (B = 8.398, SE = 2.756, p = .002) remained significant predictors of recent suicidal ideation even when controlling for more recent SITB that occurred *during* military service, the latter of which did not yield significant relationships with BSSI score (see Table 5, Model B).

Table 5
Generalized linear regression coefficients predicting severity of suicidal ideation within the past week among military personnel in outpatient mental health treatment.

	Model A			Model B		
	B	SE	p	B	SE	p
Gender	−.250	.488	.609	.001	.432	.997
Age	.017	.025	.501	.025	.022	.258
Depression	−.017	.050	.729	.005	.037	.888
Posttraumatic stress	.040	.020	.041	.015	.015	.297
Premilitary SI	1.103	.921	.231	−.123	1.020	.904
Premilitary plan	.106	2.227	.962	−1.096	2.154	.611
Premilitary NSSI	4.547	1.661	.006	3.085	1.434	.031
Premilitary attempt	8.743	3.157	.006	8.398	2.756	.002
SI during military	–	–	–	2.340	.930	.012
Plan during military	–	–	–	1.809	1.420	.203
NSSI during military	–	–	–	1.474	1.293	.254
Attempt during military	–	–	–	1.169	1.849	.527

3.3. Discussion

Results of the current study, conducted in an outpatient mental health clinic with active duty military personnel seeking mental health treatment, indicate that 17% of military personnel experienced suicidal ideation, 6% made a suicide plan, 6% engaged in NSSI, and 3% made a suicide attempt before they joined the military. Of those who made a suicide attempt while in the military, half reported suicidal ideation and one-quarter reported a suicide attempt prior to military service. The observed rates of premilitary SITB from the current study are very similar to those obtained from Study 1, suggesting convergence in findings across different samples and settings. Although the current study's small sample size limited statistical power, the current findings suggest that military personnel who made a suicide attempt prior to military service are more likely to make a suicide attempt while in the military. Specifically, 40% of participants in the current study who had made a suicide attempt prior to military service subsequently made a suicide attempt while in the military, as compared to only 4% of those who had not made a suicide attempt. Premilitary suicide attempts were also associated with significantly more severe suicidal ideation during the past week, even when controlling for more recent SITB that occurred during military service. This finding suggests that premilitary suicide attempts may lend greater vulnerability to suicidal crises than more recent SITB and emotional distress.

Although the results of Study 2 converge with those of Study 1, the current study is not without limitations. Specifically, the current study was conducted with a

relatively small sample that was predominantly comprised of Air Force personnel, which may limit generalizability to mental health settings across other branches of service and within the wider veteran population. The current study is also limited by the use of self-report methodology that relies on retrospective recall, similar to Study 1. Additional studies that use interview and behavioral methods to augment self-report methodology, and that utilize longitudinal designs are needed to further confirm these findings.

4. General discussion

Across two different samples of military personnel and veterans, we found fairly consistent rates of premilitary suicidal thoughts and behaviors. Specifically, 17%–22% of military personnel and veterans experienced suicidal ideation, 6% had made a suicide plan, 6%–9% had engaged in NSSI, and 3% had made a suicide attempt at some point in their lives prior to joining the military. Of those military personnel and veterans who had made suicide attempts during or after military service, 50% had experienced suicidal ideation and 17%–25% had made a suicide attempt before joining the military. Across both studies, premilitary suicide attempts were among the most prominent predictor of subsequent suicide attempts that occurred after joining the military, even when controlling for demographics and more recent emotional distress. The consistency of these findings across two samples that differed in setting and participant characteristics lends additional confidence to our findings. To our knowledge, these are the first studies to estimate the prevalence of SITB that occurred prior to military service and to explore their relationships with suicide attempts among military personnel and veterans.

Results of the current studies are consistent with the fluid vulnerability theory [17], which posits that some individuals have persisting, trait-like vulnerabilities to SITB that confer increased risk for suicide attempts over time. According to the fluid vulnerability theory, military personnel and veterans who have experienced SITB, especially suicide attempts, early in life (i.e., prior to military service) should be more likely to make suicide attempts after joining the military. Results of both studies are consistent with this hypothesis and suggest that some military personnel enter military service with elevated baseline risk that increases the likelihood of suicide attempts as a service member or veteran. Consistent with the fluid vulnerability theory, those military personnel and veterans with a history of premilitary suicide attempts disproportionately made suicide attempts while in the military and/or as veterans. Across both studies, up to 25% of the military personnel and veterans who made suicide attempts after joining the military came from the small subgroup of individuals (3% of each sample) who had made premilitary suicide attempts.

The fluid vulnerability theory also posits that suicidal episodes will be more severe among individuals with elevated baseline risk for suicide due to the interaction of elevated baseline risk with aggravating risk factors. In other words, because individuals with elevated baseline risk have a higher level of risk to begin with, suicidal crises are larger or more intense in overall magnitude. Consistent with this hypothesis are the results of Study 2, which found that premilitary suicide attempts and NSSI were more strongly associated with severity of current suicidal ideation. This relationship persisted even when considering recent emotional distress and even more recent SITB that occurred during military service. This latter finding supports the notion of trait vulnerabilities or predispositions for SITB among military personnel, and aligns with previous research suggesting that trait vulnerability models better explain SITB than state dependent models [28]. Along these lines, recent studies have reported that although recent situational stressors and life events are associated with suicidal behaviors among military personnel (e.g., [25]), dispositional factors such as gender and previous SITB play a relatively stronger role [9,10]. Taken together, the present studies suggest that premilitary SITB is a particularly strong risk factor for SITB that can persist over time into military service and beyond.

These findings highlight the importance of screening at the earliest stages of military enlistment (e.g., military entrance processing stations). Unfortunately, the predominant method for suicide risk screening is based on self-report methodology, which is vulnerable to response bias and motivation. Because potential military recruits with a strong desire to enter the military may have strong motivations or incentives to deny past suicide risk and other risk factors for suicide, current screening methods could potentially "miss" at-risk individuals. Aside from response bias and motivational issues, our current approaches for assessing suicide risk also suffer from considerable inaccuracies, most notably very high false positive rates (i.e., identifying individuals as being "at risk" when they will not actually attempt suicide). For example, although it is now well-established that past suicidal thoughts and behaviors are the most robust and reliable risk factors for future suicide risk (e.g., [12,26]), it is much more common for acutely suicidal individuals to *not* die by suicide in the future. In a review of 90 longitudinal studies, for instance, Owens et al.[27]) reported that 89%–95% of suicide attempters did not die by suicide within the 10 years following a first suicide attempt. Along these same lines, in the current studies only 25% of military personnel and veterans who had made a suicide attempt prior to joining the military subsequently made a suicide attempt, meaning that the vast majority of military personnel and veterans had not made another suicide attempt at the time of their participation. Thus, although routine screening of new recruits for past SITB should be encouraged and maintained, it is important to keep in mind that screening

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nonetheless has limitations. The development and implementation of screening methods that are less susceptible to response bias could therefore hold promise for improving the detection of vulnerable service members. For instance, preliminary work with computerized implicit association tests that measure reaction time in response to suicide-specific stimuli have been shown to outperform self-report methods of suicidal thinking and behaviors [28,29], although this technology is still in the early stages of development and has not yet been tested in military samples.

Although several limitations for each individual study have already been briefly discussed, it is also important to note that both studies were cross-sectional in nature and neither of the samples were representative of the larger military population. Longitudinal studies with larger, more representative samples are needed to more definitely clarify how premilitary SITB translates into increased risk for service members while in the military, especially in combination with more recent life events and situational stressors that occur during or after military service. The current study is also unable to provide any information regarding *which* military personnel and veterans with a history of premilitary SITB are most vulnerable to suicidal behavior after joining the military, which would be an important next step for improving screening and selections. Despite these limitations, the consistency of results across both samples and the conclusions obtained provide new information about an aspect of military suicide risk that has not yet been fully explored, and implicate that risk factors and variables that precede military personnel and veterans should also be included in future studies focused on suicide in these populations [10,29,30].

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